

WHAT IS CLAIMED IS:

1. A flux for fabricating an external contact on a semiconductor component having a contact pad comprising:

5 an electrically insulating polymer resin configured for deposition on the contact pad as a viscous non-flowing droplet that electrically insulates at least a portion of the external contact;

10 a fluxing agent in the polymer resin configured to clean the contact pad; and

a curing agent in the polymer resin configured to cure the polymer resin into a polymer support member for the external contact.

15 2. The flux of claim 1 wherein the polymer resin comprises a material selected from the group consisting of epoxy, silicone and rubber.

20 3. The flux of claim 1 wherein the fluxing agent comprises an acid and the curing agent comprises a solvent.

4. The flux of claim 1 wherein the fluxing agent and the curing agent comprises a same chemical compound.

25 5. The flux of claim 1 wherein the external contact comprises a solder ball placed on the droplet and the polymer support member comprises a donut shaped element.

30 6. The flux of claim 1 wherein the flux comprises a plurality of solder particles configured to form the external contact as a solder bump.

7. The flux of claim 1 wherein the component comprises a conductive trace and the flux is configured to mask at least a portion of the trace.

5 8. A flux for fabricating an external contact on a semiconductor component having a contact pad and a conductive trace proximate to the contact pad comprising:

an electrically insulating polymer resin configured for deposition onto the contact pad as a non-flowing viscous droplet configured to mask at least a portion of the  
10 conductive trace;

a fluxing agent in the polymer resin configured to clean the contact pad; and

a curing agent in the polymer resin configured to cure  
15 the polymer resin into a polymer support member attached to and rigidifying the external contact.

9. The flux of claim 8 wherein the droplet has a viscosity of about 100 to 1500 poise at a temperature of  
20 about 25 °C.

10. The flux of claim 8 wherein the external contact comprises a solder ball and the droplet is configured to adhere the solder ball to the contact pad.  
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11. The flux of claim 8 further comprising a plurality of solder particles configured to form the external contact.

12. The flux of claim 8 wherein the polymer resin  
30 comprises a material selected from the group consisting of epoxy, silicone and rubber.

13. The flux of claim 8 wherein the fluxing agent comprises an acid.

14. The flux of claim 8 wherein the curing agent comprises a solvent or a reactant.

5 15. The flux of claim 8 wherein the curing agent is configured to at least partially cure the polymer resin at a temperature of about 200 °C to 250 °C.

10 16. The flux of claim 8 wherein the component comprises a semiconductor package.

17. The flux of claim 8 wherein the component comprises a semiconductor die or a semiconductor wafer.

15 18. A flux for bonding an external contact to a contact on a semiconductor component comprising:

20 a polymer resin comprising a material selected from the class consisting of epoxy, silicone and rubber configured for deposition on the contact as a viscous non-flowing droplet able to support and electrically insulate the external contact on the contact;

a fluxing agent in the polymer resin configured to clean the contact; and

25 a curing agent in the polymer resin configured to cure the polymer resin on the contact into a polymer support member for the external contact.

30 19. The flux of claim 18 wherein the external contact comprises a solder ball.

20. The flux of claim 18 wherein the external contact comprises a solder bump.

21. The flux of claim 18 wherein the component comprises a semiconductor package, a semiconductor wafer or a semiconductor die.

5 22. The flux of claim 18 wherein the fluxing agent and the curing agent comprise a same chemical compound.

10 23. The flux of claim 18 wherein the droplet has a thickness of about one tenth to one half a diameter of the external contact.

24. A flux for bonding a solder ball to a contact pad on a semiconductor component comprising:

15 an electrically insulating polymer base material depositable on the contact pad at room temperature as a viscous non-flowing droplet configured to support the solder ball on the contact pad and to electrically insulate at least a portion of the solder ball;

20 a fluxing agent in the polymer base material configured to clean the contact pad; and

a curing agent in the polymer base material configured to cure the polymer base material into a support member on the component configured to support and rigidify the solder ball following bonding to the contact pad.

25 25. The flux of claim 24 wherein the polymer base material comprises a material selected from the class consisting of epoxy, silicone and rubber.

30 26. The flux of claim 24 wherein the curing agent comprises a solvent or a reactant and the fluxing agent comprises an acid.

27. The flux of claim 24 wherein the curing agent and the fluxing agent comprise a same chemical compound.

28. The flux of claim 24 wherein the droplet has a thickness on the contact pad of from one tenth to one half a diameter of the solder ball.

29. The flux of claim 24 wherein the component comprises a semiconductor package, a semiconductor wafer or a semiconductor die.

30. A flux for fabricating an external contact on a semiconductor component having a contact pad and a conductive trace proximate to the contact pad comprising:

an electrically insulating polymer resin formulated for deposition onto the contact pad as a non-flowing viscous droplet configured to mask at least a portion of the conductive trace;

a plurality of solder particles in the polymer resin configured to coalesce to form the external contact;

a fluxing agent in the polymer resin configured to clean the contact pad; and

a curing agent in the polymer resin configured to cure the polymer resin into a polymer support member attached to and rigidifying the external contact.

31. The flux of claim 30 wherein the droplet has a viscosity of about 100 to 1500 poise at a temperature of about 25 °C.

32. A system for bonding external contacts to contact pads on semiconductor components:  
a polymer flux; and

a flux dispensing mechanism configured to deposit the flux onto the contact pads;

the polymer flux comprising a polymer resin configured for deposition by the mechanism on the contact pads as a viscous non-flowing droplet able to support and electrically insulate the external contacts on the contact pads for bonding, a fluxing agent in the polymer resin configured to clean the contact pads; and a curing agent in the polymer resin configured to cure the polymer resin on the contact pads into a polymer support member for the external contact.

33. The system of claim 32 further comprising a placement mechanism configured to place the external contacts on the droplets and contact pads.

34. The system of claim 32 further comprising a furnace configured to reflow bond the external contacts to the contact pads and to heat the polymer flux for curing.

35. The system of claim 32 wherein the external contacts comprise solder balls.

36. The system of claim 32 wherein the polymer resin comprises a material selected from the class consisting of epoxy, silicone and rubber.

37. The system of claim 32 wherein the curing agent comprises a solvent or a reactant and the fluxing agent comprises an acid.

38. The system of claim 32 wherein the curing agent and the fluxing agent comprise a same chemical compound.

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39. The system of claim 32 wherein the droplet has a thickness on the contact pad of from one tenth to one half a diameter of the solder ball.

5 40. The system of claim 32 wherein the component comprises a semiconductor package, a semiconductor wafer or a semiconductor die.

10 41. A system for fabricating an external contact on a semiconductor component having a contact pad comprising:

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15 an electrically insulating polymer flux comprising a polymer resin, a plurality of solder particles in the polymer resin configured to coalesce into a solder bump, a fluxing agent in the polymer resin configured to clean the contact pad, and a curing agent in the polymer resin configure to cure the polymer resin into a polymer support member for the solder bump, the polymer flux having a viscosity at room temperature that permits deposition as a viscous non-flowing droplet;

20 a flux dispensing mechanism configured to deposit the droplet on the contact pad; and

25 a furnace configured to heat the polymer resin and the solder particles to a temperature sufficient to bond the solder particles to the contact pad and to cure the polymer resin into the polymer support member.

42. The system of claim 41 wherein the flux dispensing mechanism comprises a screen printing mechanism.

30 43. The system of claim 41 wherein the component comprises a package, a die, or a wafer.

44. The system of claim 41 further comprising a conveyor configured to move the component.

45. The system of claim 41 wherein the fluxing agent comprises an acid and the curing agent comprising a solvent.

5 46. A system for bonding an external contact to a contact pad on a semiconductor component:

a solder ball;

10 a polymer flux configured for deposition on the contact as a droplet of flux that supports the solder ball for bonding to the contact pad and electrically insulates at least a portion of the external contact,

15 the polymer flux comprising a polymer resin curable on the contact pad to form a polymer support member for the solder ball, a fluxing agent in the polymer resin configured to clean the contact pad, and a curing agent in the polymer resin configured to cure the polymer resin into the polymer support member;

20 a flux dispensing mechanism configured to dispense the droplet of flux on the contact pad; and

a furnace configured to heat the polymer flux and the solder ball to a temperature sufficient to cure the polymer flux and to bond the solder ball to the contact pad.

25 47. The system of claim 46 further comprising a placement mechanism configured to place the solder ball on the contact pad.

30 48. The system of claim 46 wherein the polymer resin comprises a material selected from the class consisting of epoxy, silicone and rubber.

49. The system of claim 46 wherein the curing agent comprises a solvent or a reactant.



50. The system of claim 46 wherein the fluxing agent comprises an acid.

51. The system of claim 46 wherein the droplet has a  
5 thickness on the contact pad of from one tenth to one half a  
diameter of the solder ball.

52. The system of claim 46 wherein the component  
comprises a semiconductor package, a semiconductor wafer or a  
10 semiconductor die.

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